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(56) Documents Cited
GB 2334909 A
GB 2306356 A
US 6035945 A
US 5401124 A
US 4776406 A

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(54) Abstract Title
**Drill/chisel hammer**

(57) The invention is based on a drill/chisel hammer with a drive motor arranged in a housing 10, by means of which an application tool 56 arranged in a tool holder 54 can be driven in an impact manner via an impact means and can be rotatably driven via a driven shaft 12, and with an overlock coupling 16 that is connected in series in the power flux of the rotational drive with stop means 18 between the drive motor and driven shaft 12.

It is proposed that the driven shaft 12 can be decoupled from the drive motor by means of a switching device 14 and can be fixed in the direction of rotation and that the overlock coupling 16 is integrated in the switching device 14.

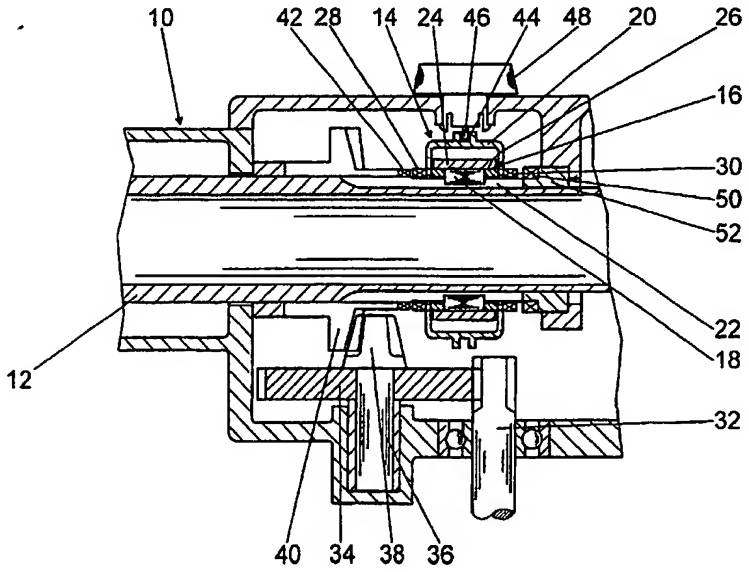


Fig. 2

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

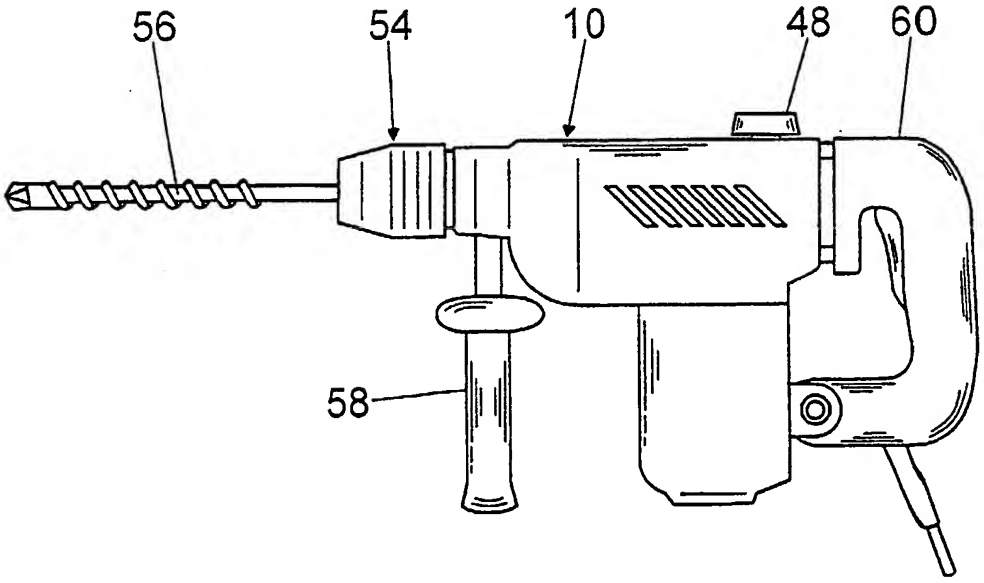
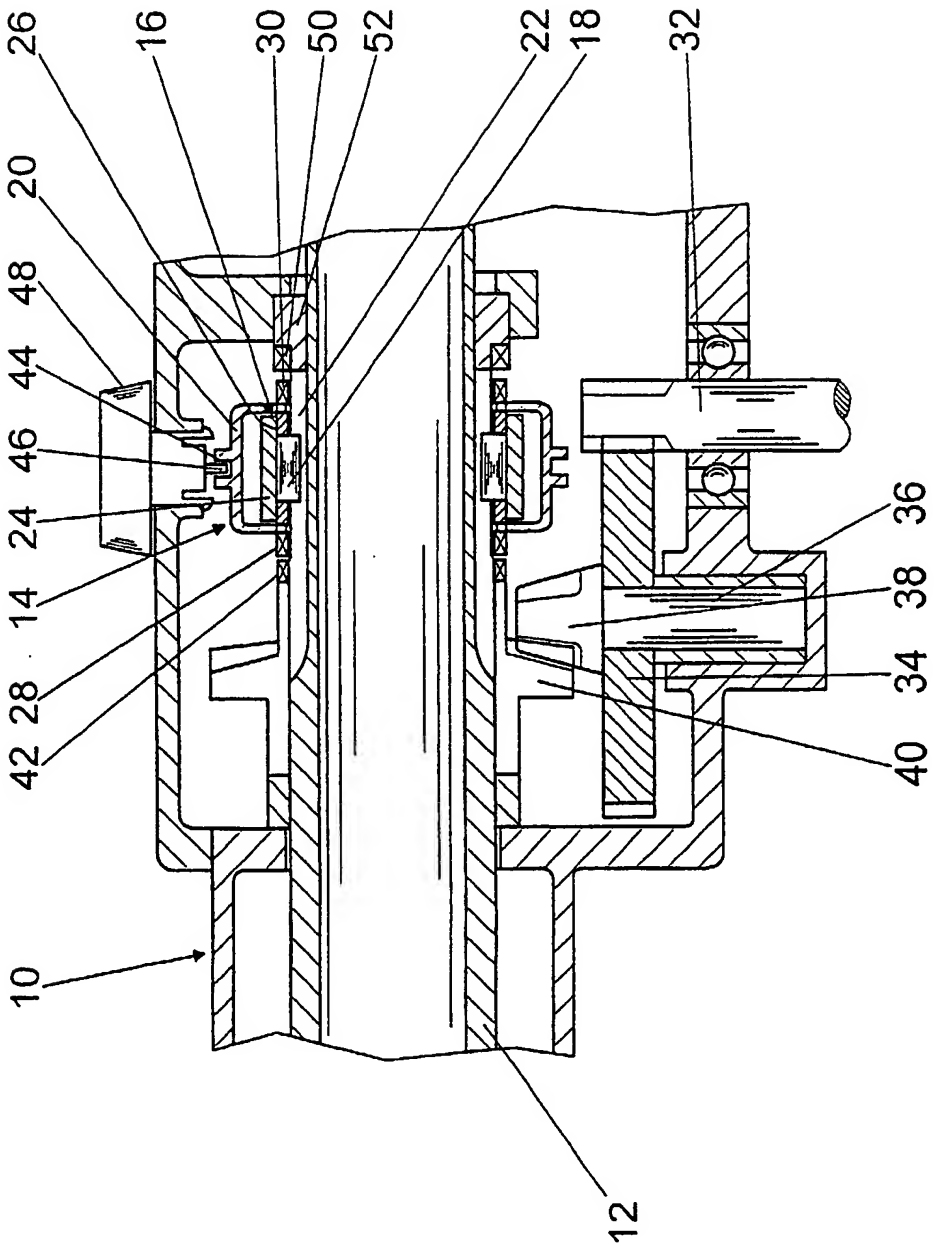



Fig. 1

Fig. 2



Drill/Chisel Hammer

Prior Art

The invention is based on a hand-held tool according to the pre-characterising part of claim 1.

In order to prevent a drill hammer held by a user continuing to rotate uncontrollably should a drill or a drill bit become jammed in a wall, it is known to connect the drill and/or the drill bit via a safety coupling to a drive of the drill hammer, the said safety coupling opening as soon as the drill jams.

A generic hand-held tool equipped with a safety coupling is known from DE 38 32 202 C1. The safety coupling has a first radially internal coupling part and a second coupling part surrounding the first coupling part for the transmission of a torque. The coupling parts are joined to one another via stop means formed as roller bearings. The roller bearings are guided in guide channels in the first coupling part. Springs are arranged in the guide channels that are supported at their first end on a channel floor and with their second end act radially outwardly on the roller bearings in the direction of the second coupling part and press the roller bearings into recesses formed in the second coupling part. If a specific torque is exceeded, the roller bearings are pressed radially inwardly from the recesses against the springs and the safety coupling opens. The roller bearings then slide back over the recesses.

Advantages of the invention

The invention is based on a drill/chisel hammer with a drive motor arranged in a housing by means of which an application tool arranged in a tool holder can be driven in an impact manner via an impact means and can be rotatably driven via a driven

shaft, and with an overlock coupling that is connected in series in the power flux of the rotational drive with stop means between the drive motor and driven shaft.

It is proposed that the driven shaft can be decoupled from the drive motor via a switching device and fixed in the direction of rotation, and that the overlock coupling be integrated in the switching device. By integrating the overlock coupling in the switching device structural parts can be used jointly and in this way structural parts, installation space and weight can be saved. Overall, a better handling and increased comfort is available to the user.

If a switching sleeve of the switching device is effectively connected via the stop means to the driven shaft and if in particular the stop means are arranged radially inside the switching sleeve, then a compact and simple construction can be achieved and installation space can advantageously be saved. The installation space in the switching sleeve can be utilised and the stop means may advantageously be meshed via the switching sleeve.

If the stop means engage radially inwardly in a positive manner in the direction of rotation in recesses, and if the stop means are overlapped by an annular spring, several stop means can be loaded with only one spring element in the direction of their stop positions. The installation can be simplified and structural parts such as for example individual springs that load the stop means can be saved.

It is furthermore proposed that the recesses be formed by a toothing provided on the driven shaft. An additional connection element and thus associated installation space, weight and installation expense can thereby be avoided. The stop means may engage directly on the driven shaft.

The stop means are guided by a carrier part. Transmission means for transmitting a drive torque and/or for transmitting a retaining torque may advantageously be formed

on this carrier part. Conveniently these transmission means comprise teeth of a toothing. By actuating the switching device a connection may be chosen for the transmission of the rotational torque or for the transmission of the retaining torque.

Drawings

Further advantages follow from the following description of the drawings. One embodiment of the invention is illustrated in the drawings. The drawings, the description and the claims contain numerous features in combination. The person skilled in the art will expediently consider the features also individually and form appropriate further combinations.

In the drawings:

Fig. 1 shows a drill/chisel hammer; and
Fig. 2 is part of a section in the longitudinal direction of the drill/chisel hammer of Fig. 1.

Description of the embodiment

Fig. 1 shows a drill/chisel hammer with an electric motor (not shown) accommodated in a housing 10 as well as a gear means and an impact means via which a tool 56 clamped in a tool holder 54 can be driven rotatably and in an impacting manner. A first handle 58 extending perpendicular to the actuation direction is secured on the housing 10 on a side of the drill/chisel hammer facing the tool holder 54. A second hoop-shaped handle 60 extending perpendicular to the actuation direction is secured on a side of the housing 10 remote from the tool 56.

A gear wheel 34 is driven via a drive shaft 32 arranged in the housing 10 (Fig. 2). The gear wheel 34 is mounted on a shaft 36. A pinion 38 is secured on the shaft 36 at an

end of the said shaft 36 facing a driven shaft 12. The driven shaft 12 is formed by a hollow shaft. The pinion 38 meshes in a ring gear 40 that is rotatably mounted in the driven shaft 12. On the ring gear 40 a toothing 42 is formed on the side remote from the tool holder 54.

The driven shaft 12 can be decoupled from the drive motor by means of a switching device 14 and fixed in the direction of rotation. In addition the drill/chisel hammer has an overlock coupling 16 that is connected in series in the force flux of the rotational drive with stop means 18 between the drive motor and driven shaft 12. According to the invention the overlock coupling 16 is integrated in the switching device 14.

The overlock coupling 16 integrated in the switching device 14 has stop means 18 formed by roller bearings that are retained by a carrier part 26. The stop means 18 engage radially inwardly in the direction of rotation and in a positive manner in recesses 22 and are radially overlapped externally by an annular spring 24. The recesses 22 are formed on the driven shaft 12 and form a toothing. The annular spring 24 presses the stop means 18 into the recesses 22.

The stop means 18 and the annular spring 24 are arranged radially inside a switching sleeve 20 of the switching device 14. The switching sleeve 20 encloses the driven shaft 12 radially and engages with its side walls radially inwardly in a positive manner in the carrier part 26 of the stop means 18. The switching sleeve 20 is in effective communication via the carrier part 26 and via the stop means 18 with the driven shaft 12. An annular groove 44 is formed on the outer circumference of the switching sleeve 20, in which groove an eccentrically arranged lug 46 of a rotary-type switch 48 mounted on the outside of the housing 10 engages positively.

Transmission means 28, 30 are formed on both sides in the axial direction on the carrier part 26 of the stop means 18. The transmission means 28, 30 are formed by toothings. By actuating the rotary-type switch 48 the switching sleeve 20 together

with the carrier part 26, the annular spring 24 and the stop means 18 can be displaced in both axial directions. If the switching sleeve 20 is displaced via the rotary-type switch 48 axially in the direction of the tool holder 54, the transmission means 28 formed on the carrier part 26 are brought into engagement with the transmission means 42 formed on the ring gear 40. A torque can then be transmitted from the drive shaft 32 of the drive motor via the gear wheel 34, the pinion 38, the ring gear 40, the transmission means 42 and 28, the carrier part 26 and via the stop means 18 to the driven shaft 12.

If the tool 56 jams in an object that is being drilled/chiselled and the torque thereby exceeds a predetermined value, which is determined by the annular spring 24 and by the contour of the recesses 22, the stop means 18 are deflected radially outwardly from the recesses 22 of the driven shaft 12 towards the annular spring 24 and overlock in the circumferential direction.

If the switching sleeve 20 is displaced via the rotary-type switch 48 axially in the direction away from the tool holder 54, then the transmission means 30 formed on the carrier part 26 are brought into engagement with transmission means 50 that are formed on a retaining ring 52 fixed in a torsionally rigid manner in the housing 10. The driven shaft 12 can thus be fixed in a torsionally rigid manner in the housing 10, and more specifically a torque can be absorbed by the driven shaft 12 via the stop means 18, the carrier part 26, the transmission means 30, 50, and via the retaining ring 52 in the housing 10.

List of reference numerals

| | | | |
|---|---|---|---|
| 10 | Housing | 36 | Shaft |
| 12 | Driven shaft | 38 | Pinion |
| 14 | Switching device | 40 | Ring gear |
| 16 | Overlock coupling | 42 | Teething |
| 18 | Stop means | 44 | Annular groove |
| 20 | Switching sleeve | 46 | Lug |
| 22 | Recess | 48 | Rotary-type switch |
| 24 | Annular spring | 50 | Transmission means |
| 26 | Carrier part | 52 | Retaining ring |
| 28 | Transmission means | 54 | Tool holder |
| 30 | Transmission means | 56 | Tool |
| 32 | Drive shaft | 58 | Handle |
| 34 | Gear wheel | 60 | Handle |

Claims

1. Drill/chisel hammer with a drive motor arranged in a housing (10), by means of which an application tool (56) arranged in a tool holder (54) can be driven in an impact manner via an impact means and can be rotatably driven via a driven shaft (12), and with an overlock coupling (16) that is connected in series in the power flux of the rotational drive with stop means (18) between the drive motor and driven shaft (12), characterised in that the driven shaft (12) can be decoupled from the drive motor with a switching device (14) and can be fixed in the direction of rotation, and the overlock coupling (16) is integrated in the switching device (14).

2. Drill/chisel hammer according to claim 1, characterised in that the switching sleeve (20) of the switching device (14) is effectively connected via the stop means (18) to the driven shaft (12).

3. Drill/chisel hammer according to claim 1 or 2, characterised in that the stop means (18) are arranged radially inside the switching sleeve (20).

4. Drill/chisel hammer according to one of the preceding claims, characterised in that the stop means (18) engage radially inwardly in the direction of rotation in a positive manner in recesses (22) and are overlapped radially outwardly by an annular spring (24).

5. Drill/chisel hammer according to claim 4, characterised in that the recesses (22) are formed by a toothing provided on the driven shaft (12).

6. Drill/chisel hammer according to one of the preceding claims, characterised in that at least one transmission means (28) for transmitting a drive torque is formed on a carrier part (26) of the stop means (18).

7. Drill/chisel hammer according to one of the preceding claims, characterised in that at least one transmission means (30) for transmitting a retaining torque is formed on a carrier part (26) of the stop means (18).

8. A drill/chisel hammer substantially as herein described with reference to the accompanying drawings.

INVESTOR IN PEOPLE

**Application No:** GB 0128365.4 **Examiner:** John Bray
**Claims searched:** 1-8 **Date of search:** 14 May 2002

# Patents Act 1977
# Search Report under Section 17

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.T): B4C

Int Cl (Ed.7): B23B 45/16; B25B 23/14; B25D 16/00; F16D 7/10

Other: On line: EPODOC; WPI; JAPIO

**Documents considered to be relevant:**

| Category | Identity of document and relevant passage | | Relevant to claims |
|---|---|---|---|
| X | GB 2334909 A | (SCINTILLA) see esp p5 ln22-p7 ln6 | 1-2 at least |
| X | GB 2306356 A | (BOSCH) see esp p2 ln18- ln33, p3 ln17-p4 ln9, p7 ln11-ln 25 & figs | 1-2 at least |
| X | GB 2121717 A | (BLACK AND DECKER) see esp p1 ln46-ln88, p1 ln129-p2 ln 12 & figs | 1-2 at least |
| X | US 6035945 | (HITACHI) see esp col 4 ln47-ln59, col 2 ln 19-ln29 & fig 1 | 1-2 at least |
| X | US 5401124 | (BOSCH) see esp col 2 ln40-ln55 & fig | 1-2 at least |
| X | US 4776406 | (BOSCH) see whole document | 1-2 at least |

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|---|---|---|---|
| X | Document indicating lack of novelty or inventive step | A | Document indicating technological background and/or state of the art. |
| Y | Document indicating lack of inventive step if combined with one or more other documents of same category. | P | Document published on or after the declared priority date but before the filing date of this invention. |
| & | Member of the same patent family | E | Patent document published on or after, but with priority date earlier than, the filing date of this application. |

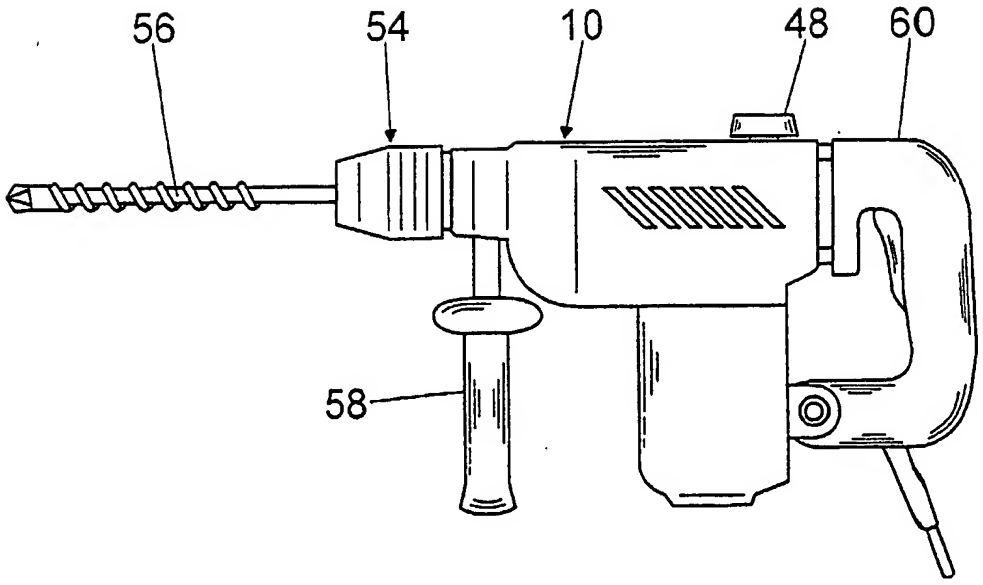


Fig. 1